



The Earth Science **DIGEST**

MARCH 1947

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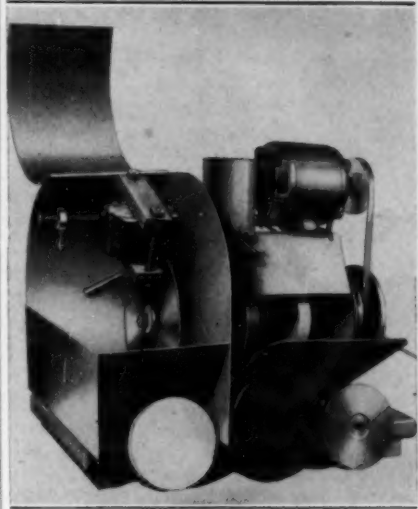
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Cover Photo

Winner of this month's cover contest was H. P. Zuidema of Wayne University, Detroit, Michigan. The subject of the photo is a rhyolite plateau in Yellowstone National Park. We are sending Mr. Zuidema a check in the amount of 5.00 for this picture. We wish to remind our readers that the contest is open to anyone and that in addition to the first prize of \$5.00 there are second and third prizes of \$3.50 and \$2.00 respectively. Anyone is eligible. The only requirements are that the photo be submitted on 6x9 glossy paper. Photos are not confined to

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Granite Knob in Sinks Canyon, 15 miles from Lander, Wyoming.
Exfoliated gray granodiorite.

Spots of Geological Interest in Wonderful Wyoming

W. D. Keller

University of Missouri

"Wonderful Wyoming" is the slogan for the state of Wyoming, and it is certainly justifiable from the stand-point of students of earth science. When you plan your vacation for this summer you should give full consideration to Wyoming if you want to visit a wide variety of geological features and enjoy beautiful scenery without driving so far between them as to wear out a set of tires on the old family bus. But at the outset, this writer wants to defend himself by saying that he is not promoting a dude ranch, a mining prospect, and that he has not been subsidized by an ambitious Chamber of Commerce. He has plenty of friends who prefer to live outside of Wyoming, but the fact remains that that state has many, easily accessible features of high geological interest.

Suppose one enters Wyoming from the northwest; he starts right out through Yellowstone National Park. Of course he will see the geysers, the bears, the steaming springs, and the canyon, but the real earth scientist will also be thinking deeper beneath the visible surface than that. He will be interested in the vast igneous body or bodies which underlie this area, and which have given up almost incalculable calories of heat to maintain the hot springs and geysers at high activity throughout their historic time. When he sees the rows of basalt columns, mafic in composition, between Tower Falls and Mammoth Hot Springs, or those which can be climbed over, and used for picnic benches, down at Sheep Eater's Cliffs, he will contrast that rock with the highly silicic obsidian at Obsidian Cliff and ponder on how



The Boar's Tusk. A volcanic plug in the Leucite Hills, near Rock Springs, Wyoming.

and why Mother Nature supplied such radically different lavas from sub surface reservoirs within such a small area. How deep is the magma still liquid if it has not completely solidified? If an effort were made to develop commercially the heat from this part in the production of power, how much could be developed and how long would it last? Why did volcanism take place in this part of the earth's crust anyhow? These questions are merely samples of many that will arise about volcanism.

But Yellowstone is not the only volcanic occurrence in Wyoming. Down in the region slightly north east of Rock Springs occurs the Leucite Hills with the spectacular Boar's Tusk, an exposed volcanic plug or neck which serves as a landmark or guide post to locate a very uncommon and interesting group of rocks. As you may guess, the Leucite Hills are so named because of the abundance of leucite in the rocks which constitute or which cover the tops of those hills and mases. Eighty years

ago the only known areas which contained leucite in abundance were on the European continent. But since 1871, when the Leucite Hills were first recognized as being an outstanding occurrence of leucite-bearing rocks, the area has repeatedly come under consideration because of the vast potential reserves of potash in the rocks. A truly significant statement may be taken from the U. S. Geological Survey Bulletin 512: "The lavas of the Leucite Hills, Wyoming, contain on the average a somewhat larger percentage of potash than any other known igneous rocks." Even though we have other resources of potash in this country, because of the very large demand, and rapidly increasing need of potash fertilizers, high interest is now being directed to the utilization of these potash-bearing rocks as a source of inorganic potassium plant nutrients. Look for an industry to be developed on Wyoming Leucite rocks before many years hence. You will probably want a specimen of these rocks for your collection. I rec-



The Tetons across Jackson Lake.

ommend that you collect a specimen of the rock named Wyomingite which may be taken from Zirkel Mesa, or from the dark rock occurring in the Boar's Tusk. Orenda Mesa is the type locality of Orendite, which also occurs in the North Cliff of Table Mountain.

Another rock which is not too common, Tinguaitite - prophyry, occurs in the strongly fluted, and prominently columnar Devil's Tower in northeastern Wyoming. Although different interpretations have been placed on the origin of the Devil's Tower, the consensus at the present time seems to be swinging back toward its origin as a volcanic plug, and this writer concurs in such a belief. Devil's Tower is certainly worth seeing by anyone who is interested in geology.

If you enter Yellowstone Park from the southeast (this is the favorite approach by the writer) as you climb Twogwotee Pass from the east you will see high above you, dark-colored mountains which show strongly layered formations which may be mistaken for sedimentary

deposits by one who is too casual in his observation. Here is a wonderful display of volcanic tuffs and agglomerates which may be studied and viewed from all angles as the road winds up to the top of the pass. You had better study these Absaroka Mountains as you climb the eastern slope because as soon as you go over the top and into sight of the Teton Mountains someone in your car is liable to say "Oh" or "Ah" at the inspiring view of the Tetons, and from here on down into Jackson Hole country almost all attention will be directed away from the Absarokas toward the Tetons.

By all means linger a while at Jackson Lake or down at the excellent camp grounds at Jenny Lake. If the season is right take a day out to climb on foot to the glacier on Grand Teton. The climb is not hard for one who has been doing a little walking, and the many wonderful views out over the valley and the lakes are well worth the trip up. For those who have never set foot on a living glacier the climax of the trip will be reached at the end of

the climb where you will see before and under you melting glacial ice, its various surface features, morainal material in and on the ice, the end moraine below the terminus of the glacier, and the milky-white water containing glacially pulverized rock flour. The crystal-clear water in the lakes normally appears blue as one looks down upon them, but when a glacial rock powder is suspended in the water it (water) takes on a greenish hue.

Remember that when you walk back out onto the plains region from the mountain climb that you have crossed the trace of a tremendously large fault along which the eastern edge of the Teton Mountains have broken and been uplifted. Drive down the valley to Moose, visit the Chapel of the Transfiguration, look through the plate glass window back of the altar and see the Tetons, and then as you drive back north be sure to observe the prominent, scoured-out valleys which were eroded down the east slope of the Tetons by large previously existing glaciers which slowly gouged deep trenches in the mountain slope. By correlating the morainal deposits which you see in the valley with those you saw from your climb to the glacier you will be able to reconstruct clearly in your own mind the depositional features left by the ice which gouged out the trenches. The Tetons have been called "The Alps of America" and justly so, for there is not a nature lover in this country who will not superlatively thrill at the sight of the spectacular peaks and erosional forms of the Tetons which come to view as one crosses the Absarokas from the east.

While you are in the Teton country you may want to drive down into Hoback canyon and see at close range the highly contorted, broken, and strongly dipping rocks which

have been twisted and torn when they were upended. The large, famous landslide called the Gros Ventre slide is only a quarter of an hour's drive from the town of Moose.

If you have not had your share of hot springs at Yellowstone Park (and even if you had your share there) you will probably enjoy driving north to the Bighorn Canyon in the Owl Creek Mountains from the Wind River Basin country north to Thermopolis. Some very spectacular faulting can be seen on the south flank of the Owl Creek Mountains where the erosion of the Wind River (which is called the Big Horn River on the other side of the range) as it goes through the mountains, has bared the rock to open view. The road is excellent and the grade is gentle through the Owl Creek Mountains. Besides the sedimentary rocks which are exposed on each flank of the Owl Creeks you will find in the interior, sharp tongues and angular injections of light-colored pegmatites into the contrasting dark hornblende and mica schists. The pegmatites are relatively simple, but you may be lucky and find a little amythestine quartz or beryl in them. Small garnets are present in some of the mica schists, and a fine-grained aplitic granite which was blasted to make the roadway is very abundantly "freckled" with small red garnets. The unconformable relationship of the Cambrian sandstone on the granite is beautifully shown in an excavation on the north contact along the road. While you are driving through the core of this mountain range give a thought as to how the river which has cut this trench through the mountain got started on its erosion job, and what the geological conditions were when it began cutting through the hard rocks at the top of the range. If you have



Glacier-fed Big Popo Agie River, a typical Wyoming mountain stream.
Lander, Wyoming.

time to examine the physiographic evidence of the region you will probably concur in the explanation that it is a super-imposed stream which at one time was swinging about on sedimentary rocks which filled the Wind River basin to an elevation corresponding to the top of the Owl Creek range.

Thermopolis at the north end of the canyon has an interesting hot spring which is depositing many calcium carbonate oolites from its cooling waters on the large terrace which overhangs the Big Horn River. You will want to drive about and see the extinct craters of former hot springs which flowed out at higher elevation in this general region. The high travertine terraces on both sides of the river and those which hold up the flat tops of the buttes and hills nearby are ancient spring deposits.

Pegmatite deposits in the eastern

part of the Owl Creek Mountain may be reached by local county roads leading out from Shoshoni. Tourmaline, spodumene, beryl, muscovite, columbite and other minerals have been taken from the pegmatites. Detailed directions for finding these deposits can be had at Shoshoni, Riverton, or Lander.

During the last war when we were more or less isolated in this country, Lander, Wyoming, became a local "jade capital of the world". It is unnecessary to tell many of our readers that the Lander jade is of very fine quality, variable in color, and that mineralogically it is a nephrite type. Local information at Lander on collecting possibilities is more timely than what might be printed now.

Within short driving distance of Lander, one can visit and collect gold bearing quartz (look for the bluish-black variety) of the Atlantic



Gold dredge washing and recovering gold from gravel, near Atlantic City, Wyoming.
 "Thar's gold in them thar vallyes."

City district, see where Middle Fork, or Big Popo Agie River, dives underground in a solution channel in limestone at the "Sinks" and emerges a short distance down the canyon on the opposite side of the valley at the "Rise", or see anticlinal structures producing petroleum in almost ideal textbook examples. The Lander-Hudson highway cuts directly through one end of a "textbook type" anticline which has been eroded by Wind River. Both Derby and Dallas domes (producing oil) which are located along the highway toward Rawlins reveal an astounding amount of geology in one only sweeping glance.

Perhaps you are interested in coal. If so, you will want to visit the open pit near Gillette. A bed of coal exceeding 90 feet in thickness has been laid open to sunlight here, and this thickness almost constitutes a world record. Not all the coal which Mother Nature put down in the Wyoming region has been pre-

served however. You may find vast areas covered by a natural clinker which represents sedimentary rocks which have been fused by the heat of burning coal beds during past times. By stretching our imaginations a little bit we may think of this as a fossil fire; don't take this nomenclature too seriously.

Collectors of mineral specimens will want some of the bentonite clay named from, and coming from Benton, County, Wyoming. Much of this interesting clay swells to several times its original volume when soaked in water. The individual particles in water are so thin that they are of colloidal dimensions in one direction.

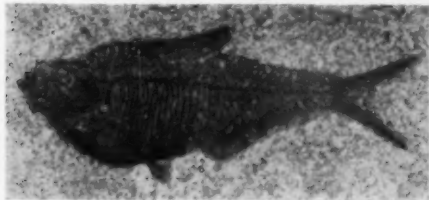
Over in the Hell's Half Acre region one can see fantastic erosion of the bad land topography type. Tilted beds and an unconformable contact are visible directly from the automobile. Expanding vermiculite has been taken out on a commercial scale near Encampment in south-



Solid layer of coal, over 90 feet thick. Near Gillete, Wyoming.

eastern Wyoming. This material is a curiosity to those interested in the wonders of Nature.

Vast quantities of oil shale are present in the Green River formation which crops out in the vicinity of Green River, Wyoming. Where freshly broken it smells strongly (or fragrantly) of petroleum which is exuded from the rock upon heating. Nearby is the little locality named Fossil which will interest those who like to do their fishing in solid rock.



Fish Slab from Fossil, Wyoming

A nice thing about any fish caught in the rock here at Fossil is that they are permanently mounted by a natural taxidermy, and can be taken home immediately without refrigeration. The preservation of a fossil fish in these shales is most excellent.

and specimens of Wyoming fish will be found in collections and museums the world over.

This list of interesting geological occurrences by no means exhausts all of those which do occur in Wyoming. They will serve to start an enthusiastic visitor on the trail of others. We all know there is considerable satisfaction in finding out new localities by our own efforts. The intention has been to discuss some interesting occurrences that are readily accessible to the person who has a short vacation time or only limited opportunity for a study of his hobby. Wyoming's primitive areas, the glaciers on the Wind River Mountains, the climbing of the high peaks, and a study of its many oil and gas fields and several mining areas can be very profitably engaged in after a first skimming of the occurrences described in this article. With some apologies again for being so enthusiastic about what Wyoming has to offer the student of earth

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The Eldon Mine

(Banff National Park, Canada)

By Lloyd Mewburn

An American Army Officer came into my shop here at Banff two summers ago and we got talking about the different mineral occurrences in this vicinity. The only one that I had heard about that was readily accessible was the Eldon Mine. The Eldon Mine is an abandoned copper-zinc property about ten miles west of here on the highway going to Lake Louise. We decided that a trip to the mine might be worthwhile, so we arranged to meet in my shop the next morning. We left early and caught the bus going to Lake Louise. We got off at Castle Mountain (now Mt. Eisenhower) and walked along to a branch road that goes down the Windermere. We had made arrangements to see the warden at Castle in order to get some directions for reaching the mine. He generously offered to drive us as far as he could along a fire road that followed the Bow River. We enjoyed the drive along the river for about three or four miles. Then the road came to an abrupt end. From there on we were on our own. We picked up our pack-board with lunches and started out. We walked along the river bank for a considerable time looking for the trail that lead up to the mine. We finally found a trail leading upward in the general direction of the mine. After a while we noticed the trail was thinning out and within a few minutes there was no trail at all. We eventually came across an abandoned cabin. We found a few ore samples on the ground around the cabin and these seemed to indicate we were on the right track. My army friend decided to climb a tree to see if he could spot the mine. He yelled down that he could see some buildings in the distance and what

appeared to be a mine dump. This was indeed encouraging because by this time we were both short of wind. We reached the buildings after another climb and found that the mine and buildings were in a sorry state of repair. There was a caved-in tunnel that led diagonally into the side of the coulee with a small dump below it. There were various pieces of abandoned machinery lying around including an old forge — an antique worthy of the Smithsonian Institute.

The American I was with was a trained mining engineer. He couldn't understand why the mine was ever given up as it was quite rich and there were several minerals there in commercial quantity. Graphite, sphalerite, galena, copper, etc., were present in quantity. We collected some copper crystals and samples of other minerals. There was a lot of mica schist, but we couldn't locate any garnets. We ate lunch and started the trek back. We followed another trail back and within minutes were at the river. We followed the river up to where the warden was to meet us. We told the warden about our excursion and the various things we had seen. He commented that we must have walked about seventeen miles. The mistake we made was in not carrying on further along the river. The warden drove us back to the highway and we caught the bus back to Banff. We divided up the booty and said goodbye. The last I saw of the American officer was as he caught the bus for Calgary and points East. I've often wondered since what happened to him. He came to Banff for a holiday but walked his feet off while he was here. The test of a real collector.

Vacationing With A Purpose In Pennsylvania

Rich E. Myers

Dept. of Geology, Muhlenberg College, Allentown, Pa.

The desire for travel seems to be an inborn urge of mankind. So also is the impelling desire to collect things. When these two ideas can be merged into one, there is no end to which the smitten party will not go to satisfy his longing. To most people the thought of such pursuits conjures up ideas filled with notions involving costly expeditions to remote corners of the world in search of buried cities of lost civilizations, or plunging through steaming jungles at the risk of life and limb to find some extremely rare variety of something or other not commonly seen in the local museum's cases. Altho such may well be, it need not be so at all, for there is one group of objects than can be collected in one day or week-end trips from almost any large city in the United States, or if the collector's time and pocketbook allow, entire vacations can be spent looking for and finding those beautiful creations of nature, on which our very civilization depends, namely minerals.

Actually hundreds of people from all walks of life, and ages ranging from the nursery to the Old Timer's Club (an organization of mineral collectors whose chief qualification for membership is the youthful age of seventy), are following trails scattered all over America that lead them to many kinds of out-of-way places where mineral specimens may be picked up for the trouble of having found them. Ghost towns, active mining camps, abandoned quarries, railway cuts, building excavations, and a host of other spots are all well known to the mineral collector. The tops of mountains and the bottoms of narrow canyons

are these people's treasure-troves. The great out-of-doors is their back yard.

Mineral collecting in itself is a hobby that teaches its neophytes much of the story of Mother Earth's past, but it also opens vistas that broaden out into geographic knowledge that can be acquired in no other way. The remark is often made that a mineral collector knows every back road for miles around, and indeed he does, for it is the back roads that usually lead to the places where minerals are found.

Very little equipment is needed to collect minerals. A hammer (preferably the type used by a geologist, but a stone mason's hammer will do nicely), and some bags to hold and transport the specimens are enough to start. A small hand lens will prove helpful, and some slight knowledge of minerals is desirable of course. This can be acquired in several ways. A visit to a good mineral collection is strongly recommended. One that is well arranged and instructive, is amply worth the time you spend studying it and getting an inspiration from the "Go thou and do likewise" ideas it will plant in your soul. An elementary book on mineralogy might be in order, and a number of excellent ones are to be had that were written for the amateur. As your collection increases, so also will your knowledge of the subject, and in no time you will discover that you have found a key to learning that was never taught in school. If you could lure some previously converted "rock hound" to serve as your guide and instructor, so much the better. In time you will probably become a member of one of

the various mineral collecting clubs that dot the country, and a confirmed addict.

To get to mineral localities, an automobile seems almost a necessity, but when we realize that some of the world famous collections were assembled long before the internal combustion engine was a practical piece of machinery, the old fashioned "Shank's Mare" may well be recommended to carry the collector to his goal.

What constitutes a good mineral locality? In as much as the term "good" to the average collector, means an ample supply of quite a number of different minerals, let us consider it from that viewpoint first. For easy collecting, a locality should be an operating one, that is quarrying or mining should be in progress today, so that new materials will be coming to light constantly. Many a famous locality of grandfather's time has long ceased to be in operation, and after countless hoards of collectors have pawed over the old dumps, little is left for the present generation, unless they will be content to gaze at the old time finds behind glass in a nearby museum. However, it is often necessary to have permission from the owners of operating localities to collect on their property, and frequently this permission is hard to secure, where on the other hand, the old localities are open to all comers. Again, you will spend hours working over the old dumps, once the thrill of mineral collecting siezes you, sometimes with practically no results, but the time will come, when you will make a "strike". From then on nothing will tear you away from the mine dumps. Like the old prospectors in their search for gold, once you have felt the thrill of the reward that comes after long hours of hard searching, your course is set. Actually, the excitement of mineral col-

lecting is the prize that rewards a tedious hunt, rather than the easily found material of a half hour's rummaging.

To visit a locality merely to collect something pretty to bring home and satisfy the hoarding instinct is not enough. Each locality has minerals because of certain conditions that existed there to produce them in the geological past, and it is indeed a challenge to the collector to find out what these conditions were, in order that he or she may fully appreciate the background that brought about the creation of the specimens so eagerly sought for and acquired with difficulty.

Then there is always the human element involved. How was this old iron mine first found, and by whom? Under what circumstances was this now abandoned zinc mine opened up, and why did it cease to operate? What laws of supply and demand functioned to close this one time large producer of feldspar? Where was the ore that one time came from this region marketed, and who were the men whose destinies were tied up with the success or failure of the venture? Questions of this type frequently challenge one to seek their answers and in so doing discover a hidden treasure of fascinating stories.

For the purpose of showing what interesting bits of information may be acquired, along with a sun tan and a good appetite, to say nothing of a fine collection of minerals, let us briefly describe a number of mineral localities in the eastern part of Pennsylvania. These are places that can easily be reached by automobile, and will repay anyone interested in visiting them for the time spent in getting there. Altho Philadelphia is used as the base from which these excursions may be taken, they can all be easily reached from New York or Baltimore.

Moreover a similar list of localities could readily be prepared for both of these cities, as well as almost any large city in the country. To visit all of these localities in one trip would require about a week, but each could be reached from Philadelphia in a day without any trouble, so anyone who follows these suggestions may arrange an itinerary at will, and need not follow the order suggested here.

The William's Quarry, Easton, Pa.

Up the Delaware River along route 611, about a two hours drive from Central Philadelphia, lies the city of Easton. Just north of the city line, along the highway overlooking the river, is the William's Quarry, locally known as the "Soapstone Quarry", one of the most important mineral collecting localities in the eastern United States. There are three reasons for this, the first being the large number of minerals found there, the second that a number of exceedingly rare minerals may be found at that place, and the third the fact that the quarry is being worked daily, and thus additional minerals are constantly being brought to light.

The most unusual minerals occurring here are those of the uranium - thorium series, particularly interesting in the light of the widespread publicity now being given to atomic energy. One of these minerals, thorianite, is not known to occur at any other place in this country. Other radio active minerals found there are carnotite, gummite, and autunite.

The most common minerals found here are talc and serpentine, and the intimately associated mineral tremolite (asbestos). These make attractive specimens, not only for the collector's cabinet, but for his rock garden as well. A recently published list of minerals occurring

here that might be found by the collector, tabulated over fifty, so it is one locality that might be well recommended for the beginner. One thing is certain, begin to collect here, and you will not go away discouraged.

For those who might care to travel by Shank's Mare, the William's Quarry is just about two miles from the railroad stations and bus depots.

The Mauch Chunk Carnotite

The William's Quarry at Easton is not the only place in Pennsylvania where carnotite is found. Not more than an hour's drive from there, is another interesting deposit of radio active material, the first found in Pennsylvania. Just beyond the city of Mauch Chunk, on route 309, is an easily spotted deposit of the mineral carnotite, which was recognized early as an ore of radium. It occurs in a small area of the rock known to geologists as the Pottsville Conglomerate. The mineral carnotite is a brilliant yellow material, and at this spot resembles dabbings of yellow paint. Often it seems to be cementing material holding the pebbles of the conglomerate together. Its presence was noted here as far back as 1874, but not until 1908, when a trolley line cut through the rock, was it identified as carnotite. When the state widened the highway a little over ten years ago, cutting back considerably into the deposits, a great deal of the material was exposed, to the delight of the mineral collectors. However, there is not enough there for any serious consideration to be given to commercial extraction, hence the carnotite at Mauch Chunk remains a spot for collecting only.

The place is easily reached. Start driving or hiking from the New Jersey Central Railroad station in Mauch Chunk, head north, and then

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Arizona Barite

(Condensed from Mining World)

Growing demand for ground barite in drilling oil wells results in the organization of a new Arizona mining concern with a promising future.

After a two-year development and construction period during which many problems typical of the times were met and surmounted, the Arizona Barite Company is now on a steady production basis, turning out about 100 tons of ground barite each day. The product is sacked and shipped to southwestern and west coast consumers, mainly in the oil fields. The use of barite by oil producers has increased sharply in the past few years, and it has only been relatively recently that its possibilities along this line have come to be fully appreciated.

Barite is used in rotary drilling muds to exert a back pressure on the high-pressure oil and gas formations, about five tons of ground barite being used for each 1,000 feet of drilling. It not only confines the gas and oil to their respective formations by sealing the walls of the hole, but also acts as a lubricant for the drilling mechanism.

The Company's barite mine is located in the Tonto National Forest at Coon Bluff, about $3\frac{1}{4}$ miles up the Salt River from Granite Reef Dam and 22 miles northeast of Mesa, Arizona. The mill is located a short distance south of Mesa on the Southern Pacific Railroad tracks, where ample water and power are available for the operation.

The finished product carries about 94 per cent BaSO_4 and has a specific gravity of 4.0 or better. The mill now treating the ore provides simply for crushing, grinding, and packaging of the crude ore; no attempt is made to concentrate the material.

However, plans have been laid for the installation of twelve No. 8 Den-

ver "Sub-A" flotation machines in order to produce a higher grade product and to permit recovery of the silver in the ore which runs about 3.2 ounces to the ton. When this is done, a higher grade barite will be produced as a concentrate and the tailings will carry sufficient silver values to warrant further treatment by a hydrometallurgical process to produce a shippable silver concentrate.

Seeks Barite Source

Events leading up to the establishment of this new barite producing concern began in 1944 when the Houston Oil Field Material Company started looking for a source of barite and employed William F. Paine to carry on its exploration program.

Initially, Paine conducted his search in the vicinity of Hatch, New Mexico, but settlement of litigation, involving the four Phoenix claims near Mesa, led to the acquisition of that property early in 1945 and the organization of the Arizona Barite Company under the laws of Arizona. The claims were purchased from Mrs. Freda O. Christmann of Tucson and four adjoining claims were located shortly thereafter. Patent to the entire group of eight is now being sought.

George O'Leary, Box 2589, Houston, Texas, is president of both the Houston Oil Field Material Company and its wholly owned subsidiary, Arizona Barite Company. Bill Paine was named production manager of Arizona Barite when it was formed in 1945 and, with W. M. Garney, who was appointed business mana-

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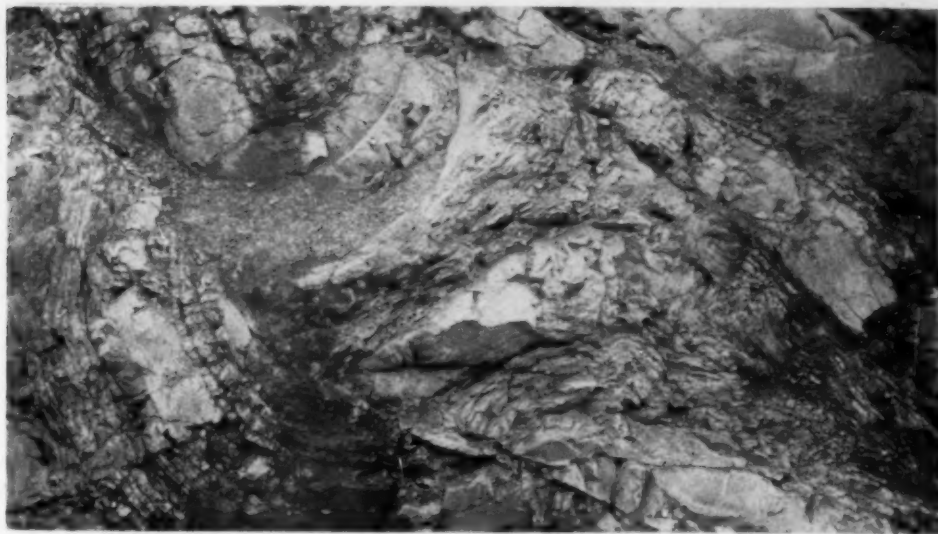


Photo No. 3. Broken, faulted tight folds. Appalachian Mountains.

Diastrophism

W. D. Keller

"Elements of Geology Series"

When diastrophism took place on this globe before the appearance of man its effect was purely geological, but nowadays when a prominent diastrophic movement occurs there are many human reactions to it. About the first thing that happens is that everyone in the affected area gets scared, ranging from mild fright with that feeling of butterflies in one's stomach through icicle rigidity to finally passing through the Pearly Gates from a heart attack. Fires break out where diastrophism is going on if it is a populated area, and then the Red Cross moves in to take care of what is left. Newspapers print big headlines, but seldom call it diastrophism, which the geologist defines as movement of the solid part of the earth. Diastrophism differs from vulcanism which is movement of lava or liquid magma in the earth.

Diastrophism counteracts the effects of erosion. Erosion operates with deposition to level the earth's

surface and would eventually, if given enough time, smooth off the earth to a monotonous peneplain. Fortunately, diastrophic forces interrupt the leveling process by raising or lowering parts of the earth crust and inject more variety in the scenery. The raising of many mountains and elevated plateaus is a result of diastrophism, and the lowering of coastal vallies beneath the sea to become drowned vallies, are likewise diastrophic effects.

Some of the clearest evidence of diastrophism does not involve either the spectacular pinnacles of mountain peaks or the sub-sea level depths of interior vallies, but is shown by the unobtrusive marine fossils which rest quietly in limestone and other sedimentary rocks now occurring many feet above sea level. The next time you collect a bag full of marine brachiopods, clams, or corals from a formation high and dry above sea level, you might well pause to speculate on

the experiences which those fossils have undergone between the time they lived as animals on or near the sea floor until they were raised to their present position far above.

The classic example of a man-made structure which has gone below sea level and then above is that of the Temple of Jupiter Serapis which was erected in Pozzuoli, Italy, by the Romans a hundred or so years before Christ. Years later, in the late 1700's, the columns of this temple were excavated from a series of marine sediments, and were found to have suffered at various levels the boring of holes by marine mollusks. The old temple which was built above sea level undoubtedly had been submerged beneath the sea and had oscillated up and down as shown by the borings at different levels, and then more recently had been elevated to its present height where it stands as a modern monument to diastrophic movement as well as to Roman architecture. We do not have to go to Italy, however, to see evidence in the rocks of oscillation above and below sea level. In the pit of almost any strip coal mine one may find alternating layers of coal and marine limestone which indicate alternating locations of the area as land and ocean floor.

Diastrophism is further manifested by tilted beds and *folds* in the crumpled part of the earth's surface. The upturned rocks in the Garden of the Gods, the Skyline Drive, and all along the front range of the Rockies, and the gently to tightly pressed folds in the Appalachian Mountains, are mute evidence of the powerful diastrophic forces which operated here. But folds are not the only evidence of crumpling forces in the earth's crust; in many instances the rocks were strained so severely that they fractured or failed and moved differentially along

the fracture—these breaks are called *faults*. Simple faults occasionally may be seen in road cuts, but more significant ones may be discovered in mines where a coal bed or other ore body is either cut away completely or raised to a position where it may be mined with profit. Folds and faults are commonly associated.

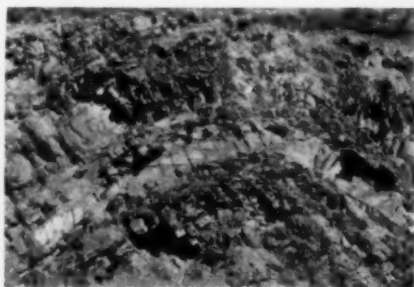


Photo No. 1. An Anticline in sandstone, Appalachian Mountains.

A fold is called an *anticline* when the beds of rock dip away from the top of it in opposite directions. (See photo No. 1). Other folds occur where the downward dip from each side is toward a common center and this basin-like structure is called a *syncline*. Where a series of folds occur, anticlines and synclines alternate along the series. In such a case the right flank of one anticline becomes the left flank of a syncline. Folds in rocks may be so small that they are evident only under the microscope or they may be so large that major structures are tens of miles in width. Very large areas, like the widespread troughs which received sediments over a large part of a continent have been called *geosynclines*.

Folds may be very tightly compressed, particularly where the rocks are soft, or when diastrophic forces were intense, as in mountain making. Compressional forces may be so great that even tight folding does not relieve the intense earth stresses; then fracturing occurs, with the



Photo No. 4. A reverse fault in Dolomite. Along Big Horn River at south flank of Owl Creek Mountains, Wyoming. Arrows indicate direction of movement.

result that the fold passes over into a fault. (See photo No. 3). Folding of rocks has probably reached its highest culmination both in intensity and in size in the Alps of Europe. A detailed study of these mountains has shown that folds which are miles in width have been thrown up high, tightly compressed, and then overturned, one on top of the other like tremendous accordion pleats. These are called *overturned* or *recumbent* folds.

In other localities where severe diastrophism has taken place rocks may be overturned from their original position of deposition. That is, young rocks which were deposited on top of older rocks may be found overturned, lying beneath the older rock. Very interesting and complex geological problems arise in an area where such spectacular structural effects have been developed.

Faults may develop in rocks which have been broken by stretching or tensional forces in the earth's crust.

A fault which appears in its simple form to have been developed by tensional forces is called a *normal* fault. In contrast to this, movement parallel to the fault zone, but in a direction opposite or reverse to that of a normal fault has given rise to a structure called a *reverse* fault. (Photo No. 4). Simple reverse faults usually appear to have been generated by forces of compression.

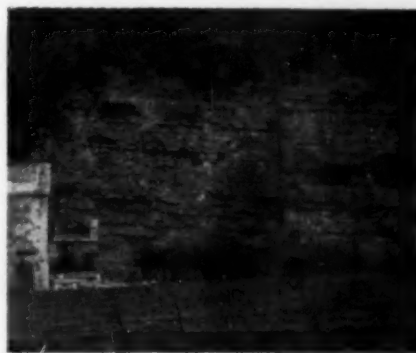


Photo No. 5. Vertical fault in Appennine Mountains, Italy.

The terms normal and reverse are descriptive terms rather than defining the forces (tensional or compressional) which cause failure of the rock. A nearly vertical fault is shown in Photo No. 5. Nearby occurred the faulted and dragged-up edges of limestones and marls shown in Photo No. 6.



Photo No. 6. Fault drag, and horizontally normal rocks in Appenine Mts.

In some parts of the world huge blocks, wedges, or slices of the crust were pushed long distances over adjacent areas along a gently inclined break. These huge faults are called *thrust* faults. A striking example of a tremendous thrust fault is in the Glacier National Park region. In this region a thick (10,000 feet or more) wedge of very old Proterozoic rock was pushed and thrust easterly along a gently inclined break from the west over the younger Cretaceous rock which make up the plains extending to the east. The old rocks were thrust sliding across the younger rock, a matter of at least ten or fifteen miles. Eastern limits of the thrust no doubt extended at one time farther east than the present Chief Mountain, or the eastern edge of Glacier National Park. During the last Ice Age, and continuing to the present time, glaciers have grown in the lofty elevations of the high thrust block and carved it into the spectacular saw-



Photo No. 2. Tightly compressed folds in shale and sandstone. Appalachian Mountains.

tooth ridges, sharp-pointed peaks, and beautiful scenic vallies which enclose dammed-up and scoured-out lake basins which we like to visit on our vacations. Both diastrophism and erosion were necessary to bring about enchanting Glacier National Park.

The high plateaus of Utah, Colorado, and the Grand Canyon region were raised by large scale diastrophic movement. Eroding streams in those areas were given new energy because of the uplift, and running water has gone to work to produce the fantastic features of topography which are so inspiring and interesting to the student of earth science who visits there.

Downward diastrophic movements also produce notable effect. The Death Valley region and other areas to the south of it have come to their positions because they were dropped down. The Chesapeake Bay, with its irregular and ragged coastline, and its innumerable inlets which represent part of the drainage basin of a large river and tributaries is a large valley that has been lowered beneath the surface of the sea. A valley so submerged is called a drowned valley, and offers conclusive evidence of diastrophism occurring near the edge of a continent.

Tremors which are sent out following the rupture of the rocks are called earthquakes. Although quakes may be severe, the movement of the

broken rocks may be only slight. Geologic evidence indicates that the raising of plateaus and the folding of mountains took place over very long intervals of time, and represent the summation of many individual movements of relatively short duration. There is no doubt that during this very century, decade, or present year the earth's crust is slowly yielding upward or downward in many places by bending, and in other places it is fracturing and therefore sending out earthquakes which we record. Just the same as vulcanism, gradation, and metamorphism are going on at the present time, so is diastrophism operating to maintain a balance in the seemingly never ending cycle of earth change.

NEBRASKA MEETING

The Nebraska Mineral & Gem Club held its Annual Meeting at the Paxton Hotel in Omaha on Tuesday evening, February 25. The following officers were elected:

President, Sharpe Osmundson.

Vice President, A. B. Nau.

Secretary-Treasurer, Mrs. Bertha C. Minardi.

Board members chosen were: J. L. Freeman, C. D. Hutchens, Adolph Jensen and E. R. Long.

Colored movies of the South-West were shown before the election.

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(From Page 14)

ger, has been in local charge of the operation since that time.

After the Houston concern found its mine and organized the Arizona Barite Company, the big problem faced was to acquire the necessary mining and milling equipment. However, war demands were so great that the WPB, OPA, and WLB were all taking measures to increase barite production, and priorities were granted for the erection of the mill and provision of necessary machinery at the mine.

The contract for the construction of the mill was let to Western-Knapp Engineering Company and work was started in August, 1945. The new 100-ton plant was taken over last April.

Undertake Development Program

The barite ore occurs in a series of true fissure veins in a volcanic conglomerate. There are seven veins which have been explored to some extent, in addition to the main vein where development operations are being concentrated.

All production is now coming from development work on the main vein and sufficient ore is being shipped to the mill to keep it operating at its capacity. This vein, which runs from $14\frac{1}{2}$ to 15 ft. in width and is about 3,000 ft. long, has been opened to a depth of 140 ft. by a steeply inclined development shaft. A station has been cut on the 60-ft. level and drifting is in progress to the east and west.

When the development shaft reaches the 200-ft. level, the company plans to run a crosscut in a southerly direction to intersect the seven other veins which outcrop on the surface. These veins are expected to widen with depth, which has been the case with the main vein.

Future plans of the company call for the sinking of a vertical shaft and

when mining operations get into full swing it is understood that the shrinkage system of stoping will be followed. All ore from underground is now hoisted in buckets by a single-drum Westcoast hoist which is powered by a gasoline engine.

The ore is dumped into a small chute, where it is hand-sorted to maintain the desired grade and is then trammed a short distance and dumped into Ford dump trucks. The company has four of these trucks which haul the crude ore to the mill, 22 miles away.

The bags of ground barite are either stored in the company warehouse or loaded into box cars for shipment to consumers.

Prior to the organization of the Arizona Barite Company, production of barite in Arizona was very erratic and relatively insignificant. However, the development work is most encouraging, and a steady market for its product in oil well drilling appears to be assured.

The company has sufficient headings in ore to take care of mill requirements. However, there is no need to develop large ore reserves that would be expensive to hold in the stopes. Thus, this company has in effect brought a new, steadily producing industry with a promising future to the state of Arizona.

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swing west with the highway around the mountain. Go on, past the bridges that cross the Lehigh River, but not over them. One and one tenth miles from the station begin to watch the rock wall to your left, and you will shortly be rewarded. Sledge hammers and chisels can be used to advantage here, for the rock is hard and does not fall apart easily. However, with a little perseverance, your collecting bags can be filled in a short time.

The Friedensville Zinc Mines

A few miles south of Bethlehem on route 12 (which joins 309 at Center Valley) is the little village of Friedensville. From 1853 to 1876 this hamlet ranked as the foremost zinc mining region of the United States, producing two thirds of all the zinc then mined in the country. Today the mines lie idle, but their dumps, particularly those of the Uberroth Mine, offer the collector who has the patience to search dilig-

ently, not only specimens of the zinc ores, (sphalerite, calamine, and smithsonite), but also the rare cadmium sulphide, greenockite, which occurs as a brilliant yellow powder or coating on the limestone, the rock in which the zinc ores occur.

These mines ceased working because of water difficulties, and cheaper mining costs elsewhere. Much ore is still underground, and will in all probability be mined someday. When the water was first encountered, the largest pump ever built was secured to keep the mine dry. President Grant was asked to make a dedication speech, and left Washington, presumably to fulfill this function. Local legend has it that the President got no further than Doylestown, where he had a gala reunion with a fellow army officer of the Civil War days, and was therefore unable to proceed to Friedensville, the following morning. The pump however was christened "The President", and thus it

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was known until it was finally removed. The building in which it was housed still stands, facing the highway, from where it can be easily seen. It has become quite a landmark, and is known locally as "The Rabbit", for its two great stacks resemble the ears of that animal, and the windows on the wall below them occupy the position of the bunny's eyes, while an old doorway furnished an excellent likeness of the creature's open mouth.

The Cornwall Iron Mine

Several miles south of Lebanon, is another interesting mine. It has the double distinction of being the tenth largest iron mine in the United States, and having been in continuous operation since 1740, which ranks it as the oldest iron mine in the country, in the point of view of uninterrupted mining. Its iron was the first worked by Peter Grub about 1734. He had purchased the tract on which the ore was found from William Allen. Grub named the locality Cornwall, from his ancestral home in the old world. In 1742 he built a furnace here, later erecting forges and a bloomery. Following his death it passed through the hands of his sons to the ironmaster Robert Coleman, and under his management Cornwall rapidly rose to become one of the most prominent of the old colonial "iron plantations". Much of the old manufacturing plant has been preserved and one may see the buildings today, where iron was made two centuries ago.

Today the mines are owned by the Bethlehem Steel Company, and are important producers of high grade iron ore. Highway 322 crosses one corner of the great open pit, which presents an awe inspiring sight. Due to the immensity of the excavation, it is strikingly suggestive of the Lake Superior iron ranges. Altho most of the ore was taken out

of the open pit, the west end of the ore body is too deep for surface mining, and the workings have been carried underground.

A great many minerals may be found on the Cornwall dumps, but collecting is not allowed without a permit. The ore consists of magnetite and specular hematite, with large quantities of pyrite (fool's gold), chalcopyrite (copper ore), and in places many well formed garnet crystals. Many other minerals are found here, and even some gold has been recovered. This has been kept by the company as a curiosity.

The Woods Chrome Mine

One of the metals that is of vital importance in dressing up the gadgets of our mechanical age is chromium. We see it daily in many places, yet few people know that there is a mine in Little Britain Township, Lancaster County, that in its day was the largest single producer of chrome in the world. Known as the Woods Mine, it was worked through the middle decades of the last century, and when finally closed, due probably to exhaustion of the ore, its total output was estimated to be around one hundred thousand tons. The mine was one of a number of chrome operations along the Pennsylvania Maryland line conducted by the Tyson mining interests of Baltimore, and in its peak of production made a fortune for its owner.

Its ore, chromite, an oxide of chromium and ferrous iron, occurs in the serpentine rocks that reach south from Chester and Lancaster Counties, Pennsylvania, on through Cecil, Hartford, and Baltimore Counties in Maryland. The area in which this rock is found because of its poor fertility, is known as "The Barrens", and it was in this poor soil that the chromite was originally hunted, and found.

The Woods Mine was, and still is,
(To Page 25)

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(From Page 23)

of great interest to mineralogists, because of a number of rare minerals associated with chromite and serpentine that are found there, such as brucite, kammerite, and genthite. Today collecting is difficult. The mine is hard to find, for its dumps are covered with a generation of scrub growth, and it is well off the beaten track. Its name however will be kept alive in many museums of the world on the labels of the beautiful minerals that it produced. Specimens may still be found there, but it is doubtful whether it will ever again produce the type of minerals that made it famous a century ago.

The Gap Nickel Mine

Another interesting old mine in Lancaster County is located a few miles west of the town of Gap, near the eastern border of the county. Here occurred a common episode in mining history, a mine was opened for one metal, and as that was mined, another more valuable one was found, but not regarded as having any value, was thrown away on the dumps. Then at a later date it was recognized by someone, and the formerly discarded material became the sought-after ore that made the mine famous. In this case, early in the eighteenth century copper bearing water in a spring led to the opening of a mine for that metal. Copper was mined spasmodically for almost a hundred years. About the middle of the last century it was discovered that the dumps were full of nickel ore, which material had previously been discarded as iron pyrites. Actually the ore was a nickel bearing pyrite, and it is easy to understand how it had missed recognition in the early days of mining.

From the time of its identification until about 1890, the Gap Mine was the principal source, and at times the only source, of the world's nickel.

It was forced to close due to the approaching exhaustion of the ores, and the opening of the Sudbury nickel mining region in Ontario.

The minerals of interest found here were the nickel sulphide, millerite (which was distinctive of the locality and did much to make it famous in the annals of mineral collecting), pyrrhotite, the chief ore, and chalcopyrite, the copper ore. Naturally a number of other common minerals were also found here.

Both of these Lancaster County mines are more or less hard to reach without an automobile, and it is suggested that anyone seeking to find them check their locations on the United States Geological Survey quadrangles before venturing forth without a guide. Finding them however, is half of the thrill of collecting there, even for the hardened collector. Try it and see for yourself.

The Pickering Creek Mines

About a mile south of Phoenixville, along the hills overlooking the south bank of the Pickering Creek, just behind the Pickering Creek Hunt Club, are a number of old mines which in the past were producers of lead, zinc, and copper. These mines have long been the happy hunting grounds for mineralogists, because a fine variety of splendid mineral specimens were found there, and even today a serious search through the old dumps will be rewarded. The lead minerals include galena, (chief ore) anglesite, cerussite, pyromorphite (for which the locality is famous), and mimetite. The zinc minerals include sphalerite (chief ore) and calamine, and the copper minerals occur as malachite, cuprite, azurite, chalcocite, chalcopyrite, and native copper. Many other minerals occur here, such as excellent quartz crystals, calcite, aragonite, ankerite, barite, pyrite limonite, and a host of others.

These mines were opened in the

early years of the last century, and were at the height of their operation during the Civil War. As recently as 1917 one of them was reopened and worked until 1919 because of the war demand. In the last war however, no efforts were made to mine any lead, zinc, or copper along the Pickering Creek, altho a few miles upstream a little deeper in Chester County, graphite was mined during the recent conflict, and numerous openings in the region around Chester Springs testify to that activity.

The Pickering Creek Mines may easily be reached from Phoenixville, either by driving or hiking, and they are not too worked over to spoil a days outing. You may not bring home anything the museum people would be proud to own, but you will find minerals if you hunt hard enough and long enough.

These are of course only a few places. Within the radius that incloses them are many other localities that lure the mineral collector on his holidays. The Kibbelhause Quarry at Perkiomenville with its beautiful little zeolite crystals, or St. Peter's Mine, at the falls of the French Creek in Chester County, and the perfect pyrite cubes found there imbedded in calcite, these might have been described too. The many feldspar quarries southwest of Philadelphia in Delaware and Chester Counties, or the iron mines and Indian jasper pits of the Reading-Durham Hills, these two might easily be included in a list of worth-while mineral localities, but it is the purpose of this article merely to introduce you to mineral collecting as a vacation hobby, not to tell you everything about it. The places selected were chosen not only because of the minerals found there, but also for the story that accompanies the specimens taken home.

(To Page 40)

Letters to the Editor

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Karl Hudson,
Durango, Colo.

Dear Mr. Berry:

I want to thank you for the sample copy of the February issue which I received in today's mail. I read it from cover to cover and have decided you have a worthwhile publication. Enclosed is \$5.00 to cover my subscription for three years. If possible start it with the January issue.

Yours truly,

Wayne Little,
Brooklyn, New York.

Gentlemen:

In the past week I have received three copies of your February number. While I like the Digest and believe it is a swell publication I don't like it to the extent of reading it three times!

A. Jenkins jr.,
Jacksonville, Fla.

Ed. Note: Due to the fact that each month we send out several thousand sample copies and use six different mailing lists, there is liable to be some duplication. (Or triplcation.) If you should receive an extra copy, just pass it on to someone that might be interested.

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(From Page 9)

science there still remains the fact
that this state is thoroughly justified
in adopting the slogan "Wonderful
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THE LOST DUTCHMAN

We were unable to include Vic Shaw's article on the Lost Dutchman Mine in this issue. We will try to get it in the April edition. Also in the April issue will be another "Elements of Geology" article by W. D. Keller. Entitled "Ground Water" this article explains the action of ground water and points out some of the interesting phenomena that accompanies it. H. P. Zuidema has sent us a short article about a *bonophone*. To those not in the know, a bonophone is a musical instrument made from the well silicified ribs of a fossil rhinoceros! — If your not already a subscriber to the Digest, send in your subscription now so that you won't miss this issue.

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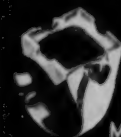
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Spanish and Italian mercury, the officials stated, are being dumped on the American market at \$75 per flask, which is the same as the 1936 price. However, the company feels that high American labor and material costs make it impossible to compete. The Cordero mine was an important mercury producer during the war, with a peak production of fifty flasks per day.

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NEW PUBLICATION

"The Midwest Geologist" is the title of a new bulletin issued by The Midwest Federation of Geological Societies. The first issue dated January 1947 was edited by Alger R. Syme of Minneapolis and Loretta E. Koppen, also from Minneapolis. The publication is neatly mimeographed and contains several articles of interest. An article entitled "Sand" by Dr. G. A. Thiel, of the University of Minnesota merits special attention. Other articles include "Pearls" by Mrs. Mihelcic of the Wisconsin Geological Society, "Fossils" by James O. Montague, past president of the Wisconsin Geological Society, and "Lapidary Technique" by William J. Bingham. An article by B. H. Wilson of Joliet, Illinois relates the history of the Midwest Federation. Mr. Wilson

was elected first president of the organization in December of 1940. Six annual conventions have been held since the first meeting in Chicago in 1940. The Federation is now made up of nine member groups. They are as follows: The Joliet Mineralogists, Marquette Geologists Association, Central Iowa Mineral Club, Wisconsin Geological Society, Chicago Rocks & Minerals Society, Michigan Mineralogical Society, The Geological Society of Minnesota, The Minnesota Mineral Club, and The Oklahoma Mineral and Gem Society. Officers of the Federation are: President, John F. Mihelcic; Vice-President, B. P. Bagrowski; Secretary, Loretta E. Koppen; Treasurer, C. W. Yaggy; Historian, B. H. Wilson; Directors-at-large, Messrs. Thomas Scanlon and Alger R. Syme.

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The Earth Science Digest

Box 57

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Real Gold and Fool's Gold

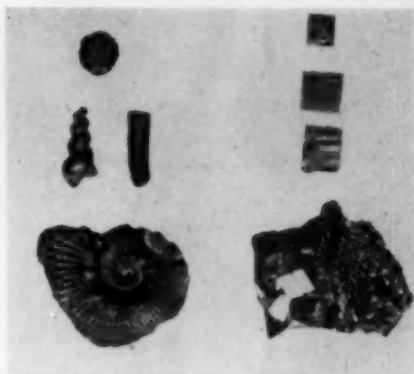


Arrowhead Crystals of Marcasite

Is there a really sincere mineral collector, earth science hobbyist, or enthusiastic camper who at one time or another has not mixed a whole lot of wishful thinking with just a little crude panning for gold when he actually knew the yellow stuff was something else, perhaps only "fool's gold" or pyrite (or marcasite). Our guess is that they are few and far between who have not improvised a gold pan out of the skillet.

Maybe it was not fool's gold that was being concentrated—probably it was a bunch of yellow flakes of hydro-biotite. Mica is a little bit heavier than quartz or feldspar, and hydro-biotite surely can look like gold when one is more enthusiastic than sensible, but mica flakes stir up too high and too quickly in a swirl of water to be the real McCoy.

Fool's gold is pyrite (or marcasite), and its chemical composition is FeS_2 . The ways to differentiate pyrite from gold are as follows. Pyrite is harder than steel and you cannot scratch it with your knife; gold is soft and can be cut easily. Pyrite is brittle and shatters without good cleavage when crushed, but gold is malleable. Pyrite leaves a dark



Pyrite, in cubes, granular mass, and as pyritized fossils.

green to black streak whereas gold has a gold-colored streak. Pyrite is brassy yellow in color when not tarnished, but gold has a rich slightly reddish tint to its yellow. After all it is very easy to tell them apart—except when you are wishing more than thinking.

Pyrite occurs in cubic crystals which are commonly striated, in pyritohedrons, and of course in granular form. In sedimentary rocks it may even replace fossils. See the photograph.

Marcasite is also FeS_2 , and looks much like pyrite except where it is in well formed crystals. Pyrite belongs in the cubic or isometric system, but marcasite is orthorhombic and crystallizes to arrowhead or cockscomb crystals. See the photograph. The crystal habit is a safe and certain criterion for their differentiation. Marcasite is less stable than pyrite, for it will break down and weather in a damp atmosphere which will hardly tarnish pyrite.

Gold is where you find it—but do not confuse "fool's gold" with it.

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The Earth Science Digest

BOX 57

OMAHA 3, NEBRASKA



Photograph No. 1. Solid dolomite does NOT effervesce freely in cold dilute acid.



Photograph No. 2. Dolomite powder effervesces in cold dilute acid.

Differentiating Calcite and Dolomite

Although ordinary calcite-containing limestone and dolomite are about as common as soap suds on Monday, still many of us have not become acquainted with a sure-fire method of differentiating them. It is really very easy, in either laboratory or field.

Simply get a small bottle of muriatic or hydrochloric acid (they are the same) which is diluted by adding one part of concentrated acid to one part of water by volume, or ask a druggist for "six-normal hydrochloric acid" and you have the proper concentration at once. A screw top bottle with an eye dropper in the stopper is most convenient.

Put a couple of drops of the acid on the bare, solid rock or mineral and if it contains calcite it will bubble (effervesce) strongly at once. If it does not effervesce freely in the solid (photograph No. 1) powder or scrape a little pile of powder and run a little of the acid into the powder. If it is dolomite the powder

will effervesce, (photograph No. 2).

If neither solid nor powder effervesces, you do not have limestone, chalk, calcite, aragonite, dolomite, dolomitic limestone, and probably none of the other simple carbonate minerals. Better check a little closer for gypsum, barite, weathered chert, shale, hornfels, or an altered igneous rock.

The exact dilution of acid is not critical but the approximate recommended strength is necessary to make the differentiation. Either concentrated or hot dilute acid will dissolve dolomite with free effervescence in the solid form, but cold, dilute acid does not. You may standardize an acid of unknown concentration by testing it against known fragments of calcite and dolomite. Keep the acid in glass, porcelain, or hard rubber well labeled, and away from children, bare skin, fabrics, or leather for it is corrosive externally and internally. If some acid is acci-

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(From Page 39)

dentally spilled on one's hands no serious harm will result if it is promptly flushed off with an excess of water.

The chemical equation of the calcite test reaction is: CaCO_3 (calcite) $-|-$ 2HCl (acid) equals CaCl_2 (calcium chloride) $-|-$ H_2O (water) $-|-$ CO_2 (carbon dioxide gas which bubbles away).

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Follow up these suggestions, and find for yourself a new delight in living, and who knows into what paths it may lead? To those who read these lines and are moved to go and see for themselves, "Happy Dig-gings".

(From Page 2)

subjects of scenic interest. Any photo that has something to do with geology, mineralogy, or paleontology may be entered. Closing date on each month's contest is the first of the month preceding date of issue.

Nebraska Meeting

The annual meeting and dinner banquet of The Nebraska Gem & Mineral Club was held Thursday, March 20, at the Hotel Rome in Omaha. Speaker of the evening was Dr. C. B. Schultz of the University of Nebraska. Dr. Schultz showed colored movies of the Museum's field expeditions in western Nebraska, Texas, and Arkansas. Dr. C. F. Schramm of Nebraska U. gave a short talk on mineral collecting.

A WILD CAT WELL

*A wild-cat well with throbbing pulse
And blackened rocker arm brings
from the depths
Of mile deep pools
The black-gold of the flowing oil.*

*The chugging engines housed near
by
Beat measured time incessantly;
Gaunt rigging stands
A dark ribbed skeleton against the
sky.*

*What alchemy of Nature this—
Watching a million years go by;
Transmuting forests and her sedgy
swamps
Into a giant for man's industry.*

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